

Patent Claims

Claims

What is claimed is:

AMENDMENTS TO THE CLAIMS:

This listing of the claims below will replace all prior versions and listing of claims in this application.

1. (Currently Amended) A genetically ~~Genetically~~ modified plant cell, ~~characterised in that it has~~ having a reduced activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells that have not been genetically modified.
2. (Currently Amended) The genetically ~~Genetically~~ modified plant cell according to Claim 1, wherein the ~~genetic modification consists in the introduction of at least one foreign nucleic acid molecule into the genome of the plant cell~~ genetically modified plant cell comprises at least one foreign nucleic acid molecule that has been introduced into the genome of the plant cell.
3. (Currently Amended) The genetically ~~Genetically~~ modified plant cell according to Claim 2, wherein the foreign nucleic acid molecule codes a Class 3 branching enzyme.
4. (Currently Amended) The genetically ~~Genetically~~ modified plant cell according to Claim 3, wherein ~~the said foreign nucleic acid molecule is chosen from the group consisting of~~
 - a) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]] codes~~ a protein with the amino acid sequence ~~given under~~ of Seq ID No. 4;
 - b) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]] codes~~ a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence ~~given under~~ of SEQ ID NO: 4;
 - c) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~include~~ includes the nucleotide sequence ~~shown under~~ of Seq ID No. 3 or a ~~complimentary~~ complementary sequence;
 - d) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);
 - e) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~hybridise~~ hybridizes with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;

- f) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; ~~[[and]]~~ or
 - g) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~represent~~ represents fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).
5. (Currently Amended) The genetically ~~Genetically~~ modified plant cell according to ~~one of Claims 2, 3 or 4~~ Claim 2, wherein the said foreign nucleic acid molecule is ~~chosen from the group consisting of~~
- a) a DNA molecule ~~molecules~~, which ~~[[code]]~~ codes at least one antisense RNA, which effects a reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme;
 - b) a DNA molecule ~~molecules~~, which by means of a co-suppression effect ~~lead~~ leads to the reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme;
 - c) a DNA molecule ~~molecules~~, which ~~[[code]]~~ codes at least one ribozyme, which splits specific transcripts of at least one endogenous gene, which codes a Class 3 branching enzyme;
 - d) a DNA molecule ~~molecules~~, which simultaneously ~~[[code]]~~ codes at least one antisense RNA and at least one sense RNA, wherein ~~the~~ said antisense RNA and ~~the~~ said sense RNA form a double-stranded RNA molecule, which effects a reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme (~~RNAi technology~~);
 - e) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~ introduced by means of in vivo mutagenesis, which ~~lead~~ leads to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects a reduction in the expression of a gene coding a Class 3 branching enzyme or results in the synthesis of inactive Class 3 branching enzymes;

- f) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes an antibody, wherein the antibody results in a reduction in the activity of a Class 3 branching enzyme due to the bonding to a Class 3 branching enzyme ~~[[.]]~~ ;
 - g) a DNA molecule ~~molecules~~, which ~~contain~~ contains transposons, wherein the integration of ~~these~~ said transposons leads to a mutation or an insertion in at least one endogenous gene coding a Class 3 branching enzyme, which effects a reduction in the expression of at least one gene coding a Class 3 branching enzyme, or results in the synthesis of inactive Class 3 branching enzymes; ~~and/or~~ or
 - h) a T-DNA molecule ~~molecules~~, which, due to insertion in at least one endogenous gene coding a Class 3 branching enzyme, ~~effect~~ effects a reduction in the expression of at least one gene coding a Class 3 branching enzyme, or result in the synthesis of inactive Class 3 branching enzyme.
6. (Currently Amended) A plant ~~Plant~~ cell according to ~~one of Claims 1 to 5~~ Claim 1, which ~~synthesises~~ synthesizes a modified starch in comparison with corresponding wild type plant cells that have not been genetically modified.
7. (Currently Amended) A plant ~~Plant~~ containing plant cells according to ~~one of Claims 1 to 6~~ Claim 1.
8. (Currently Amended) The plant ~~Plant~~ according to Claim 7, which is a starch-storing plant.
9. (Currently Amended) The plant ~~Plant~~ according to Claim 8, which is a maize, rice, wheat, rye, oat, barley, cassava, potato, sago, mung bean, pea or sorghum plant.
10. (Currently Amended) The plant ~~Plant~~ according to Claim 8, which is a potato plant.
11. (Currently Amended) Propagation material of plants according to ~~one of Claims 7 to 10~~ Claim 7, ~~containing plant cells according to one of Claims 1 to 6~~.
12. (Currently Amended) Harvestable plant parts of plants according to ~~one of Claims 7 to 10~~ Claim 7, ~~containing plant cells according to one of Claims 1 to 6~~.
13. (Currently Amended) A method ~~Method~~ for the manufacture of a genetically modified plant according to ~~one of Claims 7 to 10~~ Claim 7, ~~wherein comprising~~;
- a) genetically modifying a plant cell is ~~genetically modified~~, whereby the genetic modification leads to the reduction of the activity of a Class 3 vegetable branching

enzyme in comparison with corresponding wild type plant cells that have not been genetically modified;

- b) regenerating a plant ~~is regenerated~~ from plant cells from Step a); and
- c) if necessary, producing further plants ~~are produced~~ with the help of the plants according to Step b).

14. (Currently Amended) The method ~~Method~~ according to Claim 13, wherein the genetic modification ~~consists in the~~ comprises introduction of at least one foreign nucleic acid molecule into the genome of the plant.

15. (Currently Amended) The method ~~Method~~ according to Claim 14, wherein the said foreign nucleic acid molecule is ~~chosen from the group consisting of~~

- a) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes a protein with the amino acid sequence ~~given under of~~ Seq ID No. 4;
- b) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence ~~given under of~~ SEQ ID NO: 4;
- c) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~include~~ includes the nucleotide sequence ~~shown under of~~ Seq ID No. 3 or a ~~complimentary~~ complementary sequence;
- d) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);
- e) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~hybridise~~ hybridizes with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;
- f) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; ~~[[and]]~~ or
- g) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~represent~~ represents fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).

16. (Currently Amended) ~~The method~~ Method according to Claim 14, wherein ~~the~~ said foreign nucleic acid molecule is ~~chosen from the group consisting of~~

- a) a DNA molecule ~~molecules~~, which ~~[[code]]~~ codes at least one antisense RNA, which effects a reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme;
- b) a DNA molecule ~~molecules~~, which by means of a co-suppression effect ~~lead~~ leads to the reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme;
- c) a DNA molecule ~~molecules~~, which ~~[[code]]~~ codes at least one ribozyme, which splits specific transcripts of at least one endogenous gene, which codes a Class 3 branching enzyme;
- d) a DNA molecule ~~molecules~~, which simultaneously ~~[[code]]~~ codes at least one antisense RNA and at least one sense RNA, wherein ~~the~~ said antisense RNA and the said sense RNA form a double-stranded RNA molecule, which effects a reduction in the expression of at least one endogenous gene, which codes a Class 3 branching enzyme (~~RNAi technology~~);
- e) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~ introduced by means of in vivo mutagenesis, which lead to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects a reduction in the expression of a gene coding a Class 3 branching enzyme or results in the synthesis of inactive Class 3 branching enzymes;
- f) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes an antibody, wherein the antibody results in a reduction in the activity of a Class 3 branching enzyme due to the bonding to a Class 3 branching enzyme ~~[[.]]~~ ;
- g) a DNA molecule ~~molecules~~, which ~~contain~~ contains transposons, wherein the integration of ~~these~~ said transposons leads to a mutation or an insertion in at least one endogenous gene coding a Class 3 branching enzyme, which effects a reduction in the expression of at least one gene coding a Class 3 branching enzyme, or results in the synthesis of inactive Class 3 branching enzymes; ~~and/or~~ or

- h) a T-DNA molecule ~~molecules~~, which, due to insertion in at least one endogenous gene coding a Class 3 branching enzyme, ~~effect~~ effects a reduction in the expression of at least one gene coding a Class 3 branching enzyme, or result in the synthesis of inactive Class 3 branching enzyme.
17. (Currently Amended) ~~The method~~ Method according to ~~one of Claims 13 to 17~~ Claim 13, wherein the genetically modified plant ~~synthesises~~ synthesizes a modified starch in comparison with corresponding wild type plants that have not been genetically modified.
18. (Currently Amended) A nucleic ~~Nucleic~~ acid molecule, coding for a protein with the enzymatic activity of a Class 3 branching enzyme, ~~chosen from the group consisting of~~ comprising
- a) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes a protein with the amino acid sequence ~~given under~~ of Seq ID No. 4;
 - b) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~[[code]]~~ codes a protein, the amino acid sequence of which has an identity of at least 70% with the amino acid sequence ~~given under~~ of SEQ ID NO: 4;
 - c) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~include~~ includes the nucleotide sequence ~~shown under~~ of Seq ID No. 3 or a complimentary sequence;
 - d) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~have~~ has an identity of at least 70% with the nucleic acid sequences described under a) or c);
 - e) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~hybridise~~ hybridizes with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;
 - f) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; ~~[[and]]~~ or
 - g) a nucleic ~~Nucleic~~ acid molecule ~~molecules~~, which ~~represent~~ represents fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).
19. (Currently Amended) ~~The nucleic~~ Nucleic acid molecule according to Claim 18, ~~characterised in that it~~ which codes a Class 3 branching enzyme of potato.

20. (Currently Amended) A vector ~~Vector containing comprising~~ a nucleic acid molecule according to ~~one of Claims 18 or 19~~ Claim 18:
21. (Currently Amended) The vector ~~Vector~~ according to Claim 20, wherein the nucleic acid molecule is linked with regulatory sequences, ~~which guarantee for~~ transcription into ~~prokaryotic~~ prokaryotic or eukaryotic eukaryotic cells.
22. (Currently Amended) A vector ~~Vector containing comprising~~ a foreign nucleic acid molecule defined as in Claim 5 under a), b), c) or d).
23. (Currently Amended) A host ~~Host~~ cell, which is genetically modified with a nucleic acid molecule according to ~~one of Claims 18 or 19~~ Claim 18 or with a vector according to ~~one of Claims 20, 21 or 22~~ Claim 20.
24. (Currently Amended) A protein ~~Protein~~ with the enzymatic activity of a Class 3 branching enzyme, ~~chosen from the group consisting of comprising~~
- a) a protein ~~Proteins~~, which ~~include~~ includes the amino acid sequence ~~specified under~~ of SEQ ID No. 4, or
 - b) a protein ~~Proteins~~, which ~~[[have]]~~ has an identity of at least 70% with the amino acid sequence of the proteins identified under a).
25. (Currently Amended) The protein ~~Protein~~ according to Claim 24, wherein the Class 3 branching enzyme comes from a potato plant.
26. (Currently Amended) A modified ~~Modified~~ starch obtainable from a genetically modified plant according to ~~one of Claims 7 to 10~~ Claim 7, from propagation material according to Claim 11, or from harvestable plant parts according to Claim 12.
27. (Currently Amended) A method ~~Method~~ for the manufacture of a modified starch including the step of extracting the starch from a plant cell according to ~~one of Claims 1 to 6~~ Claim 1.
28. (Currently Amended) A method ~~Method~~ for the manufacture of a modified starch including the step of extracting the starch from a plant according to ~~one of Claims 7 to 10~~ Claim 7, ~~and/or or~~ from starch-storing parts of such a plant.
29. (Currently Amended) A method ~~Method~~ for the manufacture of a modified starch including the step of extracting the starch from harvestable plant parts according to Claim 12.

30. (Currently Amended) A method ~~Method~~ for the manufacture of a derived starch, wherein modified starch according to Claim 26 or obtainable by ~~means of a~~ the method according to ~~one of Claims 27, 28 or 29~~ Claim 27 is derived.
31. (Canceled) ~~Use of genetically modified plants according to one of Claims 7 to 10 for the manufacture of a modified starch.~~
32. (Currently Amended) A modified ~~Modified~~ starch obtainable by ~~means of a~~ the method according to ~~one of Claims 27, 28 or 29~~ Claim 27.
33. (Currently Amended) Derived starch obtainable by ~~means of a~~ the method according to Claim 30.
34. (Canceled) ~~Use of modified starch according to one of Claims 26 or 32 for the manufacture of derived starch.~~